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EXAMINER

BARRECA, NICOLE M

| ART UNIT | PAPER NUMBER |
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1756

DATE MAILED: 06/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/700,033

Applicant(s)

LOCHEL ET AL.

Examiner

Nicole M. Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 16-22 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 18, 20 and 21 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. While the specification does disclose measuring the temperature by means of a pyrometer, as recited in claim 3, there is no disclosure to the temperature being measured from the upper side. Also figure 1 illustrates pyrometer 7 as being underneath the substrate. While the specification does disclose that the chamber has an outlet for the removal of discharged solvents, there is no disclosure to detecting the concentration of solvents and that the completion of the drying is initiated by down-control of the power of the IR source when this concentration drops below a predetermined level, as recited in claim 20. While the specification gives an example of the maximum IR radiation of 2.6 μm , there is no disclosure to the maximum IR radiation being in the range from 1-3 μm , as recited in claim 21.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 16-20, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 63-221618 in view of Hwang (US Patent 5,705,232) and Kashino (US Patent 5,097,605).

JP 63-221618 discloses heating a resist layer on a semiconductor substrate using an infrared lamp 4. The temperature rising characteristics of the wafer (substrate) are inputted into controller 5 in order to control the irradiation intensity of an infrared lamp 4. The temperature and illuminance are monitored by the temperature sensor 6 and illuminance meter 7 and fed back to the controller in order to obtain the optimum temperature rising process. The irradiation intensity of the IR lamp is controlled by the temperature sensor and illuminance sensor. While JP 63-221618 does not disclose moving a plurality of substrates and drying them simultaneously (cl.22), it would have been obvious to one of ordinary skill in the art that in order to have a commercially viable process, multiple substrates must be processed at the same time.

JP 63-221618 does not disclose that the resist layer is in an deaerated chamber, that the temperature is measured underneath the substrate, or that a pyrometer is used to measure the temperature. Hwang teaches a curing method and apparatus using an infrared lamp source. Exhaust pipes 64 are used to purge clean gas, such as nitrogen

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from the chamber to remove outgassing (col.3, 34-337). The temperature may be map controlled by the use of thermocouples which preferably contact the wafer on its backside. Optical pyrometers may be used in order to increase measurement points, resulting in superior temperature control (col.3, 38-44). It would have been obvious to one of ordinary skill in the art to dry the resist in a deaerated chamber in the method of JP 63-221618 because Hwang teaches that this will prevent outgassing. It would have been obvious to one of ordinary skill in the art to measure the temperature underneath the substrate and to measure the temperature using pyrometers in the method of JP 63-221618 because Hwang teaches that both will improve temperature control.

JP 63-221618 does not disclose that the temperature is initially constant and then undergoes a linear, step-shaped or other increase throughout the drying process. Kashino teaches that it is known in the art that the surface temperature of a photosensitive material will remain constant until the residual water ratio reaches a predetermined value, at which point the surface temperature will increase to the temperature of the drying unit. See column 2, lines 1-47 and figure 1. It would have been obvious to one of ordinary skill in the art that the temperature of the resist in the drying method of JP 63-221618 would initially remain constant and then undergo a linear, step-shaped increase because Kashino teaches that it is known in the art that a photosensitive material will behave in this manner due to the presence of residual water.

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6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 63-221618 in view of Hwang and Kashino as applied to claim 16 above, and further in view of Sautome (US 5307105).

7. JP 63-221618 is silent on the maximum IR radiation and does not disclose that the maximum IR radiation is in a range of 1-3 μm . Sautome discloses a photosensitive material drying device which uses IR heaters. Figure 6 illustrates a graph describing the relationship between the amount of radiant heat and wavelength of infrared radiation (col3, 17-20). It can be seen from the graph that the maximum amount of radiant heat radiated from the IR source is approximately at 1-3 μm . It would have been obvious to one of ordinary skill in the art to have the IR radiation in the method of JP 63-221618 (in view of Hwang and Kashino) be in the range from 1-3 μm because Sautome teaches that IR wavelengths in this range will produce the maximum amounts of radiant heat in a photoresist drying device.

Response to Arguments

8. Applicant's arguments, with respect to the 103 rejection over JP 63-70940 in view of Hwang and Kashino have been fully considered and are persuasive because JP 63-70940 keeps a constant temperature and does not teach or suggest a temperature increase throughout the drying. The rejection of claim 1 has been withdrawn.

9. Applicant's arguments filed 3/20/03 with respect to the 103 rejection over JP 63-221618 in view of Hwang and Kashino have been fully considered but they are not persuasive. The applicant argues that the photoresist in JP 63-221618 has been pre-dried and that the reference only describes the temperatures in a post-exposure bake.

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In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The applicant's claims as written do not limit when in the process the photoresist is being dried, or if the photoresist has been previously exposed and/or developed.

10. The applicant also argues that Hwang does not use an IR source for a controlled, complete drying process and that Kashino only uses an IR drying system for the constant-drying rate condition. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The background of Kashino was used only to teach what is known in the art, i.e. that the temperature of the resist during the drying initially remain constant and then undergo a linear, step-shaped increase due to the presence of residual water.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 703-308-7968. The examiner can normally be reached on Monday-Thursday (8:00 am-6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

nmb 
May 29, 2003



MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700